

1 **CLAIMS:**

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3 1. A method comprising:

4 dynamically determining present members of a load-balancing cluster;

5 monitoring application-layer availability of one or more members of the

6 cluster as such availability is observed from a client-perspective.

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8 2. A method as recited in claim 1 further comprising exocusterly

9 controlling activity state of the members of the cluster.

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11 3. A method as recited in claim 1 further comprising exocusterly and

12 selectively deactivating one or more active members of the cluster.

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14 4. A method as recited in claim 1 further comprising, based upon the

15 monitoring, identifying one or more active members of the cluster that are

16 presently overwhelmed at the application-layer.

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18 5. A method as recited in claim 1 further comprising:

19 based upon the monitoring, identifying one or more active members of the

20 cluster that are presently overwhelmed at the application-layer;

21 exocusterly deactivating one or more members identified by the

22 identifying.

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1 **6.** A method as recited in claim 1 further comprising exocusterly and
2 selectively activating one or more inactive members of the cluster.

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4 **7.** A method as recited in claim 1 further comprising, based upon the
5 monitoring, identifying one or more inactive members of the cluster that are not
6 presently overwhelmed at the application-layer.

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8 **8.** A method as recited in claim 1 further comprising:
9 based upon the monitoring, identifying one or more inactive members of
10 the cluster that are not presently overwhelmed at the application-layer;
11 exocusterly activating one or more members identified by the identifying.

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13 **9.** A method as recited in claim 1 further comprising:
14 based upon the monitoring, identifying one or more active members of the
15 cluster that are presently overwhelmed at the application-layer and identifying one
16 or more inactive members of the cluster that are not presently overwhelmed at the
17 application-layer;
18 exocusterly deactivating one or more active members identified by the
19 identifying;
20 exocusterly activating one or more inactive members identified by the
21 identifying.

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23 **10.** A method as recited in claim 1 further comprising determining a
24 present activity state of members of the cluster.
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1 **11.** A method as recited in claim 1 further comprising:
2 determining a present activity state of members of the cluster;
3 tracking and persisting the activity states of the members of the cluster.

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5 **12.** A method as recited in claim 11, wherein the activity states include
6 cluster states.

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8 **13.** A method as recited in claim 11 further comprising reporting a
9 present activity state of one or more members of the cluster.

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11 **14.** A method as recited in claim 11 further comprising reporting
12 historical record of the activity states of one or more members of the cluster.

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14 **15.** A method as recited in claim 11 further comprising reporting a
15 present application-layer state of one or more members of the cluster.

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17 **16.** A method as recited in claim 11 further comprising reporting
18 historical record of the application-layer states of one or more members of the
19 cluster.

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21 **17.** A method as recited in claim 1, wherein the monitoring comprises
22 monitoring in one or more different application-layer protocols.
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1 **18.** A method as recited in claim 1, further comprises, based upon the
2 monitoring, determining the application-layer availability of one or more members
3 based upon a indicator of such availability, the indicator sent from a member being
4 monitored.

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6 **19.** A method as recited in claim 1, further comprises:
7 based upon the monitoring, determining the application-layer availability of
8 one or more members based upon a indicator of such availability, the indicator
9 sent from a member being monitored;
10 the member being monitored determining such availability and generating
11 such indicator.

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13 **20.** A computer-readable medium having computer-executable
14 instructions that, when executed by a computer, perform the method as recited in
15 claim 1.

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17 **21.** A method comprising:
18 monitoring application-layer availability of members of a load-balancing
19 cluster as such availability is observed from a client-perspective;
20 exocusterly controlling activity state of the members of the cluster.

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22 **22.** A method as recited in claim 21, wherein the controlling comprises
23 selectively deactivating one or more active members of the cluster.
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1 **23.** A method as recited in claim 21, wherein the controlling comprises,
2 based upon the monitoring, identifying one or more active members of the cluster
3 that are presently overwhelmed at the application-layer.

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5 **24.** A method as recited in claim 21, wherein the controlling comprises:
6 based upon the monitoring, identifying one or more active members of the
7 cluster that are presently overwhelmed at the application-layer;
8 exocusterly deactivating one or more members identified by the
9 identifying.

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11 **25.** A method as recited in claim 21, wherein the controlling comprises
12 selectively activating one or more inactive members of the load-balancing cluster.

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14 **26.** A method as recited in claim 21, wherein the controlling comprises,
15 based upon the monitoring, identifying one or more inactive members of the
16 cluster that are not presently overwhelmed at the application-layer.

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18 **27.** A method as recited in claim 21, wherein the controlling comprises:
19 based upon the monitoring, identifying one or more inactive members of
20 the cluster that are not presently overwhelmed at the application-layer;
21 exocusterly activating one or more members identified by the identifying.

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2 **28.** A method as recited in claim 21, wherein the controlling comprises:
3 based upon the monitoring, identifying one or more active members of the
4 cluster that are presently overwhelmed at the application-layer and identifying one
5 or more inactive members of the cluster that are not presently overwhelmed at the
6 application-layer;

7 exocusterly deactivating one or more active members identified by the
8 identifying;

9 exocusterly activating one or more inactive members identified by the
10 identifying.

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12 **29.** A method as recited in claim 21 further comprising determining a
13 present activity state of the members of the cluster.

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15 **30.** A method as recited in claim 21 further comprising:
16 determining a present activity state of the members of the cluster;
17 tracking and persisting the activity states of the members of the cluster.

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19 **31.** A method as recited in claim 30, wherein the activity state includes a
20 cluster state.

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22 **32.** A method as recited in claim 30 further comprising reporting a
23 present activity state of one or more members of the cluster.

1 **33.** A method as recited in claim 30 further comprising reporting
2 historical record of the activity states of one or more members of the cluster.

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4 **34.** A method as recited in claim 30 further comprising reporting a
5 present application-layer state of one or more members of the cluster.

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7 **35.** A method as recited in claim 30 further comprising reporting
8 historical record of the application-layer states of one or more members of the
9 cluster.

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11 **36.** A method as recited in claim 21, wherein the monitoring comprises
12 monitoring in one or more different application-layer protocols.

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14 **37.** A computer-readable medium having computer-executable
15 instructions that, when executed by a computer, performs the method as recited in
16 claim 21.

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18 **38.** A computer-readable medium having computer-executable
19 instructions that, when executed by a computer, perform a method comprising:

20 dynamically determining present members of a load-balancing cluster and
21 an activity state of each member;

22 monitoring application-layer availability of the one or more members of the
23 cluster as such availability is observed from a client-perspective;

24 exocusterly controlling the activity state of the members of the cluster.
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1 **39.** A system comprising:
2 a dynamic cluster-membership determiner configured to exocusterly and
3 dynamically determine present members of a load-balancing cluster;
4 an exocuster monitor configured to monitor application-layer availability
5 of the present members of the cluster.

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7 **40.** A system as recited in claim 39 further comprising an exocuster
8 controller configured to control an activity state of the members of the cluster.

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10 **41.** A system as recited in claim 39 further comprising an overload-
11 identifier configured to identify, based upon the monitored availability, one or
12 more active members of the cluster that are presently overwhelmed at the
13 application-layer.

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15 **42.** A system as recited in claim 39 further comprising an overload-
16 identifier configured to identify, based upon the monitored availability, one or
17 more inactive members of the cluster that are not presently overwhelmed at the
18 application-layer.

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20 **43.** A system as recited in claim 39 further comprising a state-
21 determiner configured to determine a present activity state of members of the
22 cluster.

1 **44.** A system as recited in claim 39 further comprising:
2 a state-determiner configured to determine a present activity state of
3 members of the cluster;
4 a database configured to store the activity states of the members of the
5 cluster.

6
7 **45.** A system as recited in claim 39, wherein the monitor is protocol
8 agnostic.

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10 **46.** A system comprising:
11 an exocluster monitor configured to monitor application-layer availability
12 of members of a load-balancing cluster from a client-perspective;
13 an exocluster controller configured to control an activity state of members
14 of the cluster.

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16 **47.** A system as recited in claim 46, wherein the exocluster controller is
17 further configured to exocusterly and selectively deactivate one or more active
18 members of the cluster.

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20 **48.** A system as recited in claim 46 further comprising an overload-
21 identifier configured to identify, based upon the monitored availability, one or
22 more active members of the cluster that are presently overwhelmed at the
23 application-layer.
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1 **49.** A system as recited in claim 46, wherein the exocluster controller is
2 further configured to exocusterly and selectively activate one or more inactive
3 members of the cluster.
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5 **50.** A system as recited in claim 46 further comprising an overload-
6 identifier configured to identify, based upon the monitored availability, one or
7 more inactive members of the cluster that are not presently overwhelmed at the
8 application-layer.
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10 **51.** A system as recited in claim 46 further comprising a state-
11 determiner configured to determine a present activity state of the members of the
12 cluster.
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14 **52.** A system as recited in claim 46 further comprising:
15 a state-determiner configured to determine a present activity state of the
16 members of the cluster;
17 a database configured to store the activity states of the members of the
18 cluster.
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20 **53.** A system as recited in claim 46, wherein the monitor is protocol
21 agnostic.
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1 **54.** A dynamic, active, exocluster monitoring system for monitoring
2 application-layer availability of members of a load-balancing cluster and
3 controlling an activity state of such members, the monitoring system comprising:

4 an app-monitor configured to exocusterly monitor the members of the
5 cluster from a client-perspective;

6 a cluster-control configured to exocusterly determine the activity state of
7 the members of the cluster and to exocusterly control the activity state of the
8 members of the cluster;

9 a central controller configured to coordinate and control the app-monitor
10 and the cluster-control.

11
12 **55.** A system as recited in claim 54 further comprising a database
13 configured to store state change information, including cluster state and
14 application-layer state.

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16 **56.** A system as recited in claim 54 further comprising multiple app-
17 monitors.

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19 **57.** A system as recited in claim 54 further comprising multiple cluster-
20 controls.